

Interstate Route H-1 Resurfacing

Miller Pedestrian Overpass to Kapiolani Interchange

Federal- Aid Project No. H1IJK-01-17M

CRITERIA:

References: Design Criteria for Highway Drainage June 15, 2019
HEC 22 Urban Drainage Design Manual - 3rd Edition Revision

Recurrence Interval: **50yrs**
Covers Bridge Structures and Sump areas

Time of Concentration: **10 mins**
Used Minimum per Design Criteria for Highway Drainage

Rainfall Intensity: 50yrs = **8.77 in/hr**
from NOAA Atlas 14, Station H S P A EXP STN 707

Design Method: **Rational Method**
Total Are is less than 200 acres

OVERALL RUNOFF SUMMARY:

	Area (Acres)	Q _{50yrs} (ft ³ /s)
Proposed Condition	57.94	423.128
Existing Condition	57.94	423.128
Net Increase	0	0

CONCLUSION:

The existing and proposed drainage conditions are essentially the same and there will be no increase in runoff. The roadway improvements will not have an adverse impact to the surrounding properties and the existing drainage systems.

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AREA:

Area ID	Area (ft ²)	Area (acres)
E1	9,644.33	0.22
E2	11,183.80	0.26
E3	24,689.52	0.57
E4	15,850.36	0.36
E5	20,860.56	0.48
E6	37,635.31	0.86
E7	3,626.79	0.08
E8	1,193.09	0.03
E9	15,516.95	0.36
E10	14,029.50	0.32
E11	10,248.97	0.24
E12	28,696.42	0.66
E13	5,817.48	0.13
E14	8,099.43	0.19
E15	35,596.98	0.82
E16	23,480.13	0.54
E17	24,177.52	0.56
E18	78,824.94	1.81
E19	21,102.79	0.48
E20	26,009.38	0.60
E21	31,909.77	0.73
E22	55,101.25	1.26
E23	72,640.75	1.67
E24	10,946.30	0.25
E25	4,591.73	0.11
E26	4,645.42	0.11
E27	13,231.14	0.30
E28	19,860.84	0.46
E29	29,698.20	0.68
E30	7,287.38	0.17
E31	10,580.62	0.24
E32	4,280.40	0.10
E33	29,590.23	0.68
E34	20,105.39	0.46
E35	26,421.70	0.61
E36	22,848.31	0.52
E37	21,269.34	0.49
E38	15,833.52	0.36
E39	33,410.65	0.77
E40	18,472.17	0.42
E41	31,113.76	0.71
E42	50,116.83	1.15
E43	11,410.43	0.26
E44	11,288.23	0.26

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E45	1,366.35	0.03
E46	3,756.20	0.09
E47	34,391.23	0.79
E48	3,426.00	0.08
E49	21,456.80	0.49
E50	23,257.00	0.53
E51	33,334.40	0.77
E52	33,583.50	0.77
E53	31,071.50	0.71
E54	12,070.50	0.28
E55	18,758.91	0.43
E56	9,287.00	0.21
E57	37,713.50	0.87
E58	32,113.90	0.74
E59	29,982.40	0.69
E60	17,230.26	0.40
E61	17,307.50	0.40
E62	26,953.90	0.62
E63	13,022.10	0.30
E64	11,630.30	0.27
E65	25,219.10	0.58
E66	8,782.60	0.20
E67	9,196.74	0.21
E68	33,508.20	0.77
E69	6,769.50	0.16
E70	26,412.70	0.61
E71	17,309.50	0.40
E72	11,702.70	0.27
E73	21,669.50	0.50
E74	18,896.60	0.43
E75	12,022.40	0.28
E76	20,100.60	0.46
E77	4,149.70	0.10
E78	18,464.60	0.42
E79	46,351.00	1.06
E80	13,862.00	0.32
E81	11,872.38	0.27
E82	15,122.70	0.35
E83	20,164.80	0.46
E84	45,337.90	1.04
E85	87,442.40	2.01
E86	21,877.20	0.50
E87	15,224.84	0.35
E88	14,544.93	0.33
E89	18,219.27	0.42
E90	19,900.77	0.46
E91	13,735.94	0.32

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E92	11,237.72	0.26
E93	9,869.81	0.23
E94	42,382.29	0.97
E95	12,603.73	0.29
E96	24,990.29	0.57
E97	14,225.04	0.33
E98	16,203.01	0.37
E99	39,210.61	0.90
E100	16,947.60	0.39
E101	12,871.59	0.30
E102	13,663.21	0.31
E103	6,813.38	0.16
E104	2,144.59	0.05
E105	19,209.30	0.44
E106	3,344.00	0.08
E107	7,291.90	0.17
E108	9,862.50	0.23
E109	8,185.40	0.19
E110	2,226.60	0.05
E111	18,424.00	0.42
E112	8,973.60	0.21
E113	23,912.80	0.55
E114	4,235.80	0.10
E115	3,957.60	0.09
E116	4,922.40	0.11
E117	6,259.50	0.14
E118	15,090.00	0.35
E119	12,710.27	0.29
E120	4,269.70	0.10
E121	26,992.70	0.62
E122	6,392.30	0.15
E123	10,405.20	0.24
E124	5,787.90	0.13
E125	2,277.90	0.05
E126	5,787.80	0.13
E127	1,877.98	0.04
E128	796.33	0.02
E129	2,262.52	0.05
E130	4,182.36	0.10
E131	7,675.20	0.18
E132	11,472.10	0.26
E133	12,210.00	0.28
E134	6,231.70	0.14
E135	11,038.20	0.25
E136	16,710.10	0.38
E137	6,571.30	0.15
E138	7,770.30	0.18

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E139	12,887.70	0.30
E140	6,961.00	0.16
E141	7,445.70	0.17
E142	8,257.68	0.19
E143	1,280.88	0.03
TOTAL		57.94 Acres

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RUNOFF COEFFICIENTS:

from HEC 22 Urban Drainage Design Manual

Table 3-1. Runoff Coefficients for Rational Formula.⁽¹⁴⁾	
Type of Drainage Area	Runoff Coefficient, C*
Business:	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential:	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial:	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries	0.10 - 0.25
Playgrounds	0.20 - 0.40
Railroad yard areas	0.20 - 0.40
Unimproved areas	0.10 - 0.30
Lawns:	
Sandy soil, flat, 2%	0.05 - 0.10
Sandy soil, average, 2 - 7%	0.10 - 0.15
Sandy soil, steep, 7%	0.15 - 0.20
Heavy soil, flat, 2%	0.13 - 0.17
Heavy soil, average, 2 - 7%	0.18 - 0.22
Heavy soil, steep, 7%	0.25 - 0.35
Streets:	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
Roofs	0.75 - 0.95
*Higher values are usually appropriate for steeply sloped areas and longer return periods because infiltration and other losses have a proportionally smaller effect on runoff in these cases.	

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for simplicity of calculations, used mid-range values for Asphalt and Concrete areas and a more conservative value for unimproved areas:

C_(Concrete & Asphalt) = 0.9

C_(unimproved areas) = 0.3

RUNOFF COEFFICIENTS				
Area ID	Area (ft ²)			Weighted C
	Area	Unpaved	Paved	
E1	9644.33	0.00	9644.33	0.90
E2	11183.80	0.00	11183.80	0.90
E3	24689.52	0.00	24689.52	0.90
E4	15850.36	0.00	15850.36	0.90
E5	20860.56	4995.55	15865.01	0.76
E6	37635.31	0.00	37635.31	0.90
E7	3626.79	0.00	3626.79	0.90
E8	1193.09	71.22	1121.87	0.86
E9	15516.95	0.00	15516.95	0.90
E10	14029.50	0.00	14029.50	0.90
E11	10248.97	0.00	10248.97	0.90
E12	28696.42	0.00	28696.42	0.90
E13	5817.48	673.77	5143.71	0.83
E14	8099.43	0.00	8099.43	0.90
E15	35596.98	3064.73	32532.25	0.85
E16	23480.13	0.00	23480.13	0.90
E17	24177.52	0.00	24177.52	0.90
E18	78824.94	12871.22	65953.72	0.80
E19	21102.79	0.00	21102.79	0.90
E20	26009.38	0.00	26009.38	0.90
E21	31909.77	0.00	31909.77	0.90
E22	55101.25	0.00	55101.25	0.90
E23	72640.75	0.00	72640.75	0.90
E24	10946.30	0.00	10946.30	0.90
E25	4591.73	0.00	4591.73	0.90
E26	4645.42	0.00	4645.42	0.90
E27	13231.14	0.00	13231.14	0.90
E28	19860.84	0.00	19860.84	0.90
E29	29698.20	0.00	29698.20	0.90
E30	7287.38	0.00	7287.38	0.90
E31	10580.62	0.00	10580.62	0.90
E32	4280.40	613.05	3667.35	0.81
E33	29590.23	6801.81	22788.42	0.76
E34	20105.39	0.00	20105.39	0.90
E35	26421.70	0.00	26421.70	0.90
E36	22848.31	0.00	22848.31	0.90
E37	21269.34	0.00	21269.34	0.90
E38	15833.52	0.00	15833.52	0.90

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E39	33410.65	0.00	33410.65	0.90
E40	18472.17	0.00	18472.17	0.90
E41	31113.76	0.00	31113.76	0.90
E42	50116.83	0.00	50116.83	0.90
E43	11410.43	0.00	11410.43	0.90
E44	11288.23	1861.59	9426.64	0.80
E45	1366.35	0.00	1366.35	0.90
E46	3756.20	44.15	3712.05	0.89
E47	34391.23	6143.39	28247.84	0.79
E48	3426.00	0.00	3426.00	0.90
E49	21456.80	0.00	21456.80	0.90
E50	23257.00	0.00	23257.00	0.90
E51	33334.40	9632.00	23702.40	0.73
E52	33583.50	0.00	33583.50	0.90
E53	31071.50	0.00	31071.50	0.90
E54	12070.50	2854.00	9216.50	0.76
E55	18758.91	2905.10	15853.81	0.81
E56	9287.00	0.00	9287.00	0.90
E57	37713.50	1264.70	36448.80	0.88
E58	32113.90	0.00	32113.90	0.90
E59	29982.40	0.00	29982.40	0.90
E60	17230.26	1610.30	15619.96	0.84
E61	17307.50	0.00	17307.50	0.90
E62	26953.90	0.00	26953.90	0.90
E63	13022.10	0.00	13022.10	0.90
E64	11630.30	0.00	11630.30	0.90
E65	25219.10	0.00	25219.10	0.90
E66	8782.60	1172.30	7610.30	0.82
E67	9196.74	1170.50	8026.24	0.82
E68	33508.20	0.00	33508.20	0.90
E69	6769.50	1064.50	5705.00	0.81
E70	26412.70	2002.30	24410.40	0.85
E71	17309.50	5645.40	11664.10	0.70
E72	11702.70	2261.60	9441.10	0.78
E73	21669.50	0.00	21669.50	0.90
E74	18896.60	0.00	18896.60	0.90
E75	12022.40	2837.70	9184.70	0.76
E76	20100.60	0.00	20100.60	0.90
E77	4149.70	0.00	4149.70	0.90
E78	18464.60	0.00	18464.60	0.90
E79	46351.00	33548.40	12802.60	0.47
E80	13862.00	5354.90	8507.10	0.67
E81	11872.38	11872.38	0.00	0.30
E82	15122.70	0.00	15122.70	0.90
E83	20164.80	0.00	20164.80	0.90
E84	45337.90	28229.40	17108.50	0.53
E85	87442.40	69391.20	18051.20	0.42

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E86	21877.20	6928.70	14948.50	0.71
E87	15224.84	0.00	15224.84	0.90
E88	14544.93	0.00	14544.93	0.90
E89	18219.27	0.00	18219.27	0.90
E90	19900.77	0.00	19900.77	0.90
E91	13735.94	0.00	13735.94	0.90
E92	11237.72	0.00	11237.72	0.90
E93	9869.81	0.00	9869.81	0.90
E94	42382.29	16806.89	25575.40	0.66
E95	12603.73	10741.57	1862.16	0.39
E96	24990.29	0.00	24990.29	0.90
E97	14225.04	0.00	14225.04	0.90
E98	16203.01	5448.58	10754.43	0.70
E99	39210.61	0.00	39210.61	0.90
E100	16947.60	2221.92	14725.68	0.82
E101	12871.59	0.00	12871.59	0.90
E102	13663.21	0.00	13663.21	0.90
E103	6813.38	0.00	6813.38	0.90
E104	2144.59	0.00	2144.59	0.90
E105	19209.30	0.00	19209.30	0.90
E106	3344.00	0.00	3344.00	0.90
E107	7291.90	51.83	7240.07	0.90
E108	9862.50	97.26	9765.24	0.89
E109	8185.40	51.67	8133.73	0.90
E110	2226.60	25.88	2200.72	0.89
E111	18424.00	0.00	18424.00	0.90
E112	8973.60	0.00	8973.60	0.90
E113	23912.80	483.40	23429.40	0.89
E114	4235.80	1186.60	3049.20	0.73
E115	3957.60	894.50	3063.10	0.76
E116	4922.40	185.70	4736.70	0.88
E117	6259.50	117.50	6142.00	0.89
E118	15090.00	957.09	14132.91	0.86
E119	12710.27	2590.10	10120.17	0.78
E120	4269.70	257.60	4012.10	0.86
E121	26992.70	1250.00	25742.70	0.87
E122	6392.30	0.00	6392.30	0.90
E123	10405.20	1231.70	9173.50	0.83
E124	5787.90	327.10	5460.80	0.87
E125	2277.90	147.80	2130.10	0.86
E126	5787.80	167.00	5620.80	0.88
E127	1877.98	0.00	1877.98	0.90
E128	796.33	0.00	796.33	0.90
E129	2262.52	0.00	2262.52	0.90
E130	4182.36	0.00	4182.36	0.90
E131	7675.20	0.00	7675.20	0.90
E132	11472.10	0.00	11472.10	0.90

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E133	12210.00	1009.20	11200.80	0.85
E134	6231.70	1187.20	5044.50	0.79
E135	11038.20	953.80	10084.40	0.85
E136	16710.10	4983.60	11726.50	0.72
E137	6571.30	336.00	6235.30	0.87
E138	7770.30	1906.00	5864.30	0.75
E139	12887.70	0.00	12887.70	0.90
E140	6961.00	0.00	6961.00	0.90
E141	7445.70	0.00	7445.70	0.90
E142	8257.68	0.00	8257.68	0.90
E143	1280.88	0.00	1280.88	0.90

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EXISTING CONDITION RUNOFF:

$$I_{50\text{yr}} = 8.77 \text{ in/hr}$$

50 yr Runoff Quantities (Existing Condition)				
Area ID	Area (acres)	Weighted C	Q _{50yr} (ft ³ /s)	Dischard Points
E1	0.22	0.90	1.736	to existing DI at H-1 Sta. 174+49± WB
E2	0.26	0.90	2.052	to existing CB at H-1 Sta. 174+49± EB
E3	0.57	0.90	4.499	to existing DI at H-1 Sta. 179+27± WB
E4	0.36	0.90	2.841	to existing DI at H-1 Sta. 179+30± EB
E5	0.48	0.76	3.199	to existing CB at Kinau St. Off Ramp Sta. 4+61±
E6	0.86	0.90	6.788	to existing DI at H-1 Sta. 187+59± WB
E7	0.08	0.90	0.631	to existing DI at H-1 Sta. 180+25± EB
E8	0.03	0.86	0.226	to existing CB downstream of Kinau St. Off Ramp
E9	0.36	0.90	2.841	to existing DI at H-1 Sta. 183+47± EB
E10	0.32	0.90	2.526	to existing DI at H-1 Sta. 186+00± EB
E11	0.24	0.90	1.894	to existing DI at H-1 Sta. 188+00± EB
E12	0.66	0.90	5.209	to existing DI at Vineyard Blvd. Off Ramp Sta. 169+54±
E13	0.13	0.83	0.946	to existing DI at H-1 Sta. 188+75± EB
E14	0.19	0.90	1.500	to existing DI at H-1 Sta. 190+19± EB
E15	0.82	0.85	6.113	to existing CB at H-1 Sta. 191+03± EB
E16	0.54	0.90	4.262	to existing DI at H-1 Sta. 191+01± WB
E17	0.56	0.90	4.420	to existing DI at H-1 Sta. 195+24± WB
E18	1.81	0.80	12.699	to existing DI at Ward Ave On Ramp Sta. 3+83±
E19	0.48	0.90	3.789	to existing DI at H-1 Sta. 199+24± WB
E20	0.60	0.90	4.736	to existing CB at H-1 Sta. 202+47± WB
E21	0.73	0.90	5.762	to existing CB at H-1 Sta. 202+48± EB
E22	1.26	0.90	9.945	to existing DI at H-1 Sta. 219+93± WB
E23	1.67	0.90	13.181	to existing DI at H-1 Sta. 222+99± EB
E24	0.25	0.90	1.973	to existing CB at Piikoi St. On Ramp Sta. 16+60±
E25	0.11	0.90	0.868	to existing DI at H-1 Sta. 220+93± WB
E26	0.11	0.90	0.868	to existing DI at H-1 Sta. 221+93± WB
E27	0.30	0.90	2.368	to existing CB at H-1 Sta. 224+75± WB
E28	0.46	0.90	3.631	to existing DI at H-1 Sta. 225+98± EB
E29	0.68	0.90	5.367	to existing CB at H-1 Sta. 227+96± WB
E30	0.17	0.90	1.342	to existing DI at H-1 Sta. 227+25± EB
E31	0.24	0.90	1.894	to existing DI at H-1 Sta. 228+25± EB
E32	0.10	0.81	0.710	to existing CB at Lunalilo St. Sta. 59+74±
E33	0.68	0.76	4.532	to existing CB at Lunalilo St. Sta. 60+67±
E34	0.46	0.90	3.631	to existing DI at H-1 Sta. 230+51± WB
E35	0.61	0.90	4.815	to existing DI at H-1 Sta. 230+06± EB
E36	0.52	0.90	4.104	to existing DI at H-1 Sta. 234+17± WB
E37	0.49	0.90	3.868	to existing CB at H-1 Sta. 234+66± EB
E38	0.36	0.90	2.841	to existing DI at H-1 Sta. 240+68± WB
E39	0.77	0.90	6.078	to existing DI at H-1 Sta. 240+34± Punahou St. Off Ramp
E40	0.42	0.90	3.315	to existing DI at H-1 Sta. 245+71± WB
E41	0.71	0.90	5.604	to existing DI at H-1 Sta. 246+08± WB

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E42	1.15	0.90	9.077	to existing DI at H-1 Sta. 245+89± EB
E43	0.26	0.90	2.052	to existing CB further South of Punahou St. at existing hospital driveway
E44	0.26	0.80	1.824	to existing CB Punahou St. On Ramp Sta. 240+93±
E45	0.03	0.90	0.237	to existing CB Punahou St. On Ramp Sta. 244+77±
E46	0.09	0.89	0.702	to existing CB further down South of Punahou St. at existing church driveway
E47	0.79	0.79	5.473	sheet flows to Alexander St. and eventually to existing CBs at S Beretania St. Intersection
E48	0.08	0.90	0.631	to existing CB at H-1 Sta. 251+71± WB
E49	0.49	0.90	3.868	to existing CB at Metcalf St. Sta. 0+15±
E50	0.53	0.90	4.183	to existing CB at H-1 Sta. 257+25± EB
E51	0.77	0.73	4.930	to existing CB at Metcalf St. Sta. 6+98±
E52	0.77	0.90	6.078	to existing CB at H-1 Sta. 262+70± WB
E53	0.71	0.90	5.604	to existing DI at H-1 Sta. 263+73± EB
E54	0.28	0.76	1.866	sheet flows to Artesian St.
E55	0.43	0.81	3.055	to existing CB at Bingham St. Sta. 19+46±
E56	0.21	0.90	1.658	to existing DI at H-1 Sta. 264+63± WB
E57	0.87	0.88	6.714	to existing CB at Bingham St. Sta. 24+31±
E58	0.74	0.90	5.841	to existing CB at H-1 Sta. 271+20± WB
E59	0.69	0.90	5.446	to existing CB at H-1 Sta. 274+58± EB
E60	0.40	0.84	2.947	to existing CB at Bingham St. Sta. 29+40±
E61	0.40	0.90	3.157	to existing DI at H-1 Sta. 274+58± WB
E62	0.62	0.90	4.894	to existing DI at H-1 Sta. 277+56± WB
E63	0.30	0.90	2.368	to existing CB at H-1 Sta. 277+11± EB
E64	0.27	0.90	2.131	to existing CB at H-1 279+39± EB
E65	0.58	0.90	4.578	to existing DI at H-1 Sta. 2+67± EB
E66	0.20	0.82	1.438	to existing CB at Bingham St. Sta. 31+93±
E67	0.21	0.82	1.510	to existing CB at Bingham St. Sta. 35+28±
E68	0.77	0.90	6.078	to existing DI at H-1 Sta. 2+51± WB
E69	0.16	0.81	1.137	to existing CB at Bingham St. Sta. 36+63±
E70	0.61	0.85	4.547	to existing CB at Bingham St. Sta. 39+40±
E71	0.40	0.70	2.456	to existing CB along Wilder Avenue before the Off Ramp
E72	0.27	0.78	1.847	to existing CB along Wilder Ave. Sta. 3+10±
E73	0.50	0.90	3.947	to existing CB at H-1 6+36± WB
E74	0.43	0.90	3.394	to existing DI at H-1 6+45± EB
E75	0.28	0.76	1.866	to existing CB along Wilder Ave. Sta. 6+21±
E76	0.46	0.90	3.631	to existing DI at H-1 Sta. 10+33± WB
E77	0.10	0.90	0.789	to existing DI at H-1 Sta. 10+25± EB
E78	0.42	0.90	3.315	to existing CB at University Ave. On Ramp "U-1" Sta.
E79	1.06	0.47	4.369	to existing CB at University Ave. On Ramp "U-1" Sta.
E80	0.32	0.67	1.880	to existing CB at University Ave. On Ramp "U-8" Sta.
E81	0.27	0.30	0.710	sheet flow to University Ave.
E82	0.35	0.90	2.763	to existing CB at H-1 Sta. 18+04± WB
E83	0.46	0.90	3.631	to existing CB at H-1 Sta. 18+47± EB
E84	1.04	0.53	4.834	to existing CB at University Ave. Off Ramp "U-3" Sta.
E85	2.01	0.42	7.404	to existing CB at University Ave. On Ramp "U-6" Sta.

Interstate Route H-1 Resurfacing

Miller Pedestrian Overpass to Kapiolani Interchange

Federal- Aid Project No. H11JK-01-17M

E86	0.50	0.71	3.113	to existing CB at University Ave. Off Ramp "U-5" Sta.
E87	0.35	0.90	2.763	to existing DI at H-1 Sta. 20+80± WB
E88	0.33	0.90	2.605	to existing DI at H-1 Sta. 22+89± EB
E89	0.42	0.90	3.315	to existing DI at H-1 Sta. 24+37± WB
E90	0.46	0.90	3.631	to existing CB at H-1 Sta. 27+04± EB
E91	0.32	0.90	2.526	to existing DI at H-1 Sta. 27+04± WB
E92	0.26	0.90	2.052	to existing CB at H-1 Sta. 28+99± WB
E93	0.23	0.90	1.815	to existing CB at H-1 Sta. 29+02± EB
E94	0.97	0.66	5.615	to existing CB at Old Waialae Rd. On Ramp T Sta. 7+31±
E95	0.29	0.39	0.992	to existing CB at H-1 Sta. 31+01± EB
E96	0.57	0.90	4.499	to existing CB at H-1 Sta. 33+58± WB
E97	0.33	0.90	2.605	to existing CB at H-1 Sta. 33+20± EB
E98	0.37	0.70	2.271	to existing CB at H-1 Sta. 34+19± EB
E99	0.90	0.90	7.104	to existing CB at H-1 Sta. 36+43± WB
E100	0.39	0.82	2.805	to existing CB at H-1 Sta. 36+00± EB
E101	0.30	0.90	2.368	to existing CB at H-1 Sta. 37+78± EB (King St. On Ramp)
E102	0.31	0.90	2.447	to existing CB at Old Waiale Road Off Ramp Sta. 8+90± Lt.
E103	0.16	0.90	1.263	to existing CB at H-1 Sta. 43+42± WB
E104	0.05	0.90	0.395	to existing CB at H-1 Sta. 45+53± WB
E105	0.44	0.90	3.473	to existing CB at H-1 Sta. 41+42± EB
E106	0.08	0.90	0.631	to existing DI at H-1 Sta. 44+76± EB (Kapiolani Blvd. On
E107	0.17	0.90	1.342	to existing CB further down South of Ward St. at Kinoo St. intersection
E108	0.23	0.89	1.795	to existing DI further down Kinalau Place
E109	0.19	0.90	1.500	to existing CB further down South of Ward St. at Kinoo St. intersection
E110	0.05	0.89	0.390	to existing CB at Ward Ave. Sta. 2+67± Lt.
E111	0.42	0.90	3.315	to existing CB further down South of Keeaumoku St. at Kinoo St. intersection
E112	0.21	0.90	1.658	to existing CB on a parking lot North of Keeaumoku overpass
E113	0.55	0.89	4.293	to existing CB at Keeaumoku St. Sta. 12+76± Rt.
E114	0.10	0.73	0.640	to existing CB at Lunalilo St. Sta. 67+80± Lt.
E115	0.09	0.76	0.600	to existing CB at Lunalilo St. Sta. 68+91± Lt.
E116	0.11	0.88	0.849	to existing CB at Lunalilo St. Sta. 70+13± Lt.
E117	0.14	0.89	1.093	to existing CB at Keeaumoku St. Sta. 14+02± Lt.
E118	0.35	0.86	2.640	to existing CB at Lunalilo St. Sta. 45+80± Lt.
E119	0.29	0.78	1.984	to existing CB South of the Lunalilo St. and Pensacola St.
E120	0.10	0.86	0.754	to existing CB at Lunalilo St. Sta. 46+01± Lt.
E121	0.62	0.87	4.731	to existing CB at Lunalilo St. Sta. 53+02± Lt.
E122	0.15	0.90	1.184	to existing CB South of the Lunalilo St. and Piikoi St.
E123	0.24	0.83	1.747	to existing CB at Lunalilo St. Sta. 54+02± Lt.
E124	0.13	0.87	0.992	to existing CB at Piikoi Service Rd. Sta. 14+94± Rt.
E125	0.05	0.86	0.377	to existing CB at Lunalilo St. Sta. 56+46± Lt.
E126	0.13	0.88	1.003	to existing CB at Lunalilo St. Sta. 57+22± Lt.
E127	0.04	0.90	0.316	sheet flow to South Beretania Street
E128	0.02	0.90	0.158	sheet flow to South Beretania Street

Interstate Route H-1 Resurfacing

Miller Pedestrian Overpass to Kapiolani Interchange

Federal- Aid Project No. H1IJK-01-17M

E129	0.05	0.90	0.395	to existing CB at McCully St. Sta. 2+48± Lt.
E130	0.10	0.90	0.789	to existing CB at McCully St. Sta. 3+66± Lt.
E131	0.18	0.90	1.421	to existing CB at McCully St. Sta. 1+89± Rt.
E132	0.26	0.90	2.052	to existing CB at McCully St. Sta. 8+91± Rt.
E133	0.28	0.85	2.087	sheet flow to Dole St.
E134	0.14	0.79	0.970	to existing CB at Metcalf St. Sta. 9+25± Lt.
E135	0.25	0.85	1.864	to existing CB at Waiaka Road Sta. 1+02± Lt.
E136	0.38	0.72	2.399	to existing CB at Waiaka Road Sta. 1+10± Rt.
E137	0.15	0.87	1.144	to existing CB at Waiaka Road Sta. 7+54± Lt.
E138	0.18	0.75	1.184	to existing CB at Waiaka Road Sta. 7+69± Rt.
E139	0.30	0.90	2.368	sheet flow to existing CB at start of Vineyard Blvd. Off
E140	0.16	0.90	1.263	sheet flow south of Punahou St. and Bingham St.
E141	0.17	0.90	1.342	sheet flow downstream South of Old Waialae Road
E142	0.19	0.90	1.500	sheet flow downstream South of Kapiolani Blvd. Off
E143	0.03	0.90	0.237	sheet flow downstream South of Kapiolani Blvd. Off
TOTAL			423.128 ft ³ /s	

Interstate Route H-1 Resurfacing

Miller Pedestrian Overpass to Kapiolani Interchange

Federal- Aid Project No. H1IJK-01-17M

PROPOSED CONDITION RUNOFF:

$$I_{50yr} = 8.77 \text{ in/hr}$$

50 yr Runoff Quantities (Proposed Condition)				
Area ID	Area (acres)	Weighted C	Q_{50yr} (ft ³ /s)	Dischard Points
P1	0.22	0.90	1.736	to existing DI at H-1 Sta. 174+49± WB
P2	0.26	0.90	2.052	to existing CB at H-1 Sta. 174+49± EB
P3	0.57	0.90	4.499	to existing DI at H-1 Sta. 179+27± WB
P4	0.36	0.90	2.841	to existing DI at H-1 Sta. 179+30± EB
P5	0.48	0.76	3.199	to existing CB at Kinau St. Off Ramp Sta. 4+61±
P6	0.86	0.90	6.788	to existing DI at H-1 Sta. 187+59± WB
P7	0.08	0.90	0.631	to existing DI at H-1 Sta. 180+25± EB
P8	0.03	0.86	0.226	to existing CB downstream of Kinau St. Off Ramp
P9	0.36	0.90	2.841	to existing DI at H-1 Sta. 183+47± EB
P10	0.32	0.90	2.526	to existing DI at H-1 Sta. 186+00± EB
P11	0.24	0.90	1.894	to existing DI at H-1 Sta. 188+00± EB
P12	0.66	0.90	5.209	to existing DI at Vineyard Blvd. Off Ramp Sta. 169+54±
P13	0.13	0.83	0.946	to existing DI at H-1 Sta. 188+75± EB
P14	0.19	0.90	1.500	to existing DI at H-1 Sta. 190+19± EB
P15	0.82	0.85	6.113	to existing CB at H-1 Sta. 191+03± EB
P16	0.54	0.90	4.262	to existing DI at H-1 Sta. 191+01± WB
P17	0.56	0.90	4.420	to existing DI at H-1 Sta. 195+24± WB
P18	1.81	0.80	12.699	to existing DI at Ward Ave On Ramp Sta. 3+83±
P19	0.48	0.90	3.789	to existing DI at H-1 Sta. 199+24± WB
P20	0.60	0.90	4.736	to existing CB at H-1 Sta. 202+47± WB
P21	0.73	0.90	5.762	to existing CB at H-1 Sta. 202+48± EB
P22	1.26	0.90	9.945	to existing DI at H-1 Sta. 219+93± WB
P23	1.67	0.90	13.181	to existing DI at H-1 Sta. 222+99± EB
P24	0.25	0.90	1.973	to existing CB at Piikoi St. On Ramp Sta. 16+60±
P25	0.11	0.90	0.868	to existing DI at H-1 Sta. 220+93± WB
P26	0.11	0.90	0.868	to existing DI at H-1 Sta. 221+93± WB
P27	0.30	0.90	2.368	to existing CB at H-1 Sta. 224+75± WB
P28	0.46	0.90	3.631	to existing DI at H-1 Sta. 225+98± EB
P29	0.68	0.90	5.367	to existing CB at H-1 Sta. 227+96± WB
P30	0.17	0.90	1.342	to existing DI at H-1 Sta. 227+25± EB
P31	0.24	0.90	1.894	to existing DI at H-1 Sta. 228+25± EB
P32	0.10	0.81	0.710	to existing CB at Lunalilo St. Sta. 59+74±
P33	0.68	0.76	4.532	to existing CB at Lunalilo St. Sta. 60+67±
P34	0.46	0.90	3.631	to existing DI at H-1 Sta. 230+51± WB
P35	0.61	0.90	4.815	to existing DI at H-1 Sta. 230+06± EB
P36	0.52	0.90	4.104	to existing DI at H-1 Sta. 234+17± WB
P37	0.49	0.90	3.868	to existing CB at H-1 Sta. 234+66± EB
P38	0.36	0.90	2.841	to existing DI at H-1 Sta. 240+68± WB
P39	0.77	0.90	6.078	to existing DI at H-1 Sta. 240+34± Punahou St. Off Ramp
P40	0.42	0.90	3.315	to existing DI at H-1 Sta. 245+71± WB
P41	0.71	0.90	5.604	to existing DI at H-1 Sta. 246+08± WB

Interstate Route H-1 Resurfacing

Miller Pedestrian Overpass to Kapiolani Interchange

Federal- Aid Project No. H11JK-01-17M

P42	1.15	0.90	9.077	to existing DI at H-1 Sta. 245+89± EB
P43	0.26	0.90	2.052	to existing CB further South of Punahou St. at existing hospital driveway
P44	0.26	0.80	1.824	to existing CB Punahou St. On Ramp Sta. 240+93±
P45	0.03	0.90	0.237	to existing CB Punahou St. On Ramp Sta. 244+77±
P46	0.09	0.89	0.702	to existing CB further down South of Punahou St. at existing church driveway
P47	0.79	0.79	5.473	sheet flows to Alexander St. and eventually to existing CBs at S Beretania St. Intersection
P48	0.08	0.90	0.631	to existing CB at H-1 Sta. 251+71± WB
P49	0.49	0.90	3.868	to existing CB at Metcalf St. Sta. 0+15±
P50	0.53	0.90	4.183	to existing CB at H-1 Sta. 257+25± EB
P51	0.77	0.73	4.930	to existing CB at Metcalf St. Sta. 6+98±
P52	0.77	0.90	6.078	to existing CB at H-1 Sta. 262+70± WB
P53	0.71	0.90	5.604	to existing DI at H-1 Sta. 263+73± EB
P54	0.28	0.76	1.866	sheet flows to Artesian St.
P55	0.43	0.81	3.055	to existing CB at Bingham St. Sta. 19+46±
P56	0.21	0.90	1.658	to existing DI at H-1 Sta. 264+63± WB
P57	0.87	0.88	6.714	to existing CB at Bingham St. Sta. 24+31±
P58	0.74	0.90	5.841	to existing CB at H-1 Sta. 271+20± WB
P59	0.69	0.90	5.446	to existing CB at H-1 Sta. 274+58± EB
P60	0.40	0.84	2.947	to existing CB at Bingham St. Sta. 29+40±
P61	0.40	0.90	3.157	to existing DI at H-1 Sta. 274+58± WB
P62	0.62	0.90	4.894	to existing DI at H-1 Sta. 277+56± WB
P63	0.30	0.90	2.368	to existing CB at H-1 Sta. 277+11± EB
P64	0.27	0.90	2.131	to existing CB at H-1 279+39± EB
P65	0.58	0.90	4.578	to existing DI at H-1 Sta. 2+67± EB
P66	0.20	0.82	1.438	to existing CB at Bingham St. Sta. 31+93±
P67	0.21	0.82	1.510	to existing CB at Bingham St. Sta. 35+28±
P68	0.77	0.90	6.078	to existing DI at H-1 Sta. 2+51± WB
P69	0.16	0.81	1.137	to existing CB at Bingham St. Sta. 36+63±
P70	0.61	0.85	4.547	to existing CB at Bingham St. Sta. 39+40±
P71	0.40	0.70	2.456	to existing CB along Wilder Avenue before the Off Ramp
P72	0.27	0.78	1.847	to existing CB along Wilder Ave. Sta. 3+10±
P73	0.50	0.90	3.947	to existing CB at H-1 6+36± WB
P74	0.43	0.90	3.394	to existing DI at H-1 6+45± EB
P75	0.28	0.76	1.866	to existing CB along Wilder Ave. Sta. 6+21±
P76	0.46	0.90	3.631	to existing DI at H-1 Sta. 10+33± WB
P77	0.10	0.90	0.789	to existing DI at H-1 Sta. 10+25± EB
P78	0.42	0.90	3.315	to existing CB at University Ave. On Ramp "U-1" Sta.
P79	1.06	0.47	4.369	to existing CB at University Ave. On Ramp "U-1" Sta.
P80	0.32	0.67	1.880	to existing CB at University Ave. On Ramp "U-8" Sta.
P81	0.27	0.30	0.710	sheet flow to University Ave.
P82	0.35	0.90	2.763	to existing CB at H-1 Sta. 18+04± WB
P83	0.46	0.90	3.631	to existing CB at H-1 Sta. 18+47± EB
P84	1.04	0.53	4.834	to existing CB at University Ave. Off Ramp "U-3" Sta.
P85	2.01	0.42	7.404	to existing CB at University Ave. On Ramp "U-6" Sta.

Interstate Route H-1 Resurfacing

Miller Pedestrian Overpass to Kapiolani Interchange

Federal- Aid Project No. H11JK-01-17M

P86	0.50	0.71	3.113	to existing CB at University Ave. Off Ramp "U-5" Sta.
P87	0.35	0.90	2.763	to existing DI at H-1 Sta. 20+80± WB
P88	0.33	0.90	2.605	to existing DI at H-1 Sta. 22+89± EB
P89	0.42	0.90	3.315	to existing DI at H-1 Sta. 24+37± WB
P90	0.46	0.90	3.631	to existing CB at H-1 Sta. 27+04± EB
P91	0.32	0.90	2.526	to existing DI at H-1 Sta. 27+04± WB
P92	0.26	0.90	2.052	to existing CB at H-1 Sta. 28+99± WB
P93	0.23	0.90	1.815	to existing CB at H-1 Sta. 29+02± EB
P94	0.97	0.66	5.615	to existing CB at Old Waialae Rd. On Ramp T Sta. 7+31±
P95	0.29	0.39	0.992	to existing CB at H-1 Sta. 31+01± EB
P96	0.57	0.90	4.499	to existing CB at H-1 Sta. 33+58± WB
P97	0.33	0.90	2.605	to existing CB at H-1 Sta. 33+20± EB
P98	0.37	0.70	2.271	to existing CB at H-1 Sta. 34+19± EB
P99	0.90	0.90	7.104	to existing CB at H-1 Sta. 36+43± WB
P100	0.39	0.82	2.805	to existing CB at H-1 Sta. 36+00± EB
P101	0.30	0.90	2.368	to existing CB at H-1 Sta. 37+78± EB (King St. On Ramp)
P102	0.31	0.90	2.447	to existing CB at Old Waiale Road Off Ramp Sta. 8+90± Lt.
P103	0.16	0.90	1.263	to existing CB at H-1 Sta. 43+42± WB
P104	0.05	0.90	0.395	to existing CB at H-1 Sta. 45+53± WB
P105	0.44	0.90	3.473	to existing CB at H-1 Sta. 41+42± EB
P106	0.08	0.90	0.631	to existing DI at H-1 Sta. 44+76± EB (Kapiolani Blvd. On
P107	0.17	0.90	1.342	to existing CB further down South of Ward St. at Kināo
P108	0.23	0.89	1.795	to existing DI further down Kinalau Place
P109	0.19	0.90	1.500	to existing CB further down South of Ward St. at Kināo
P110	0.05	0.89	0.390	to existing CB at Ward Ave. Sta. 2+67± Lt.
P111	0.42	0.90	3.315	to existing CB further down South of Keeaumoku St. at
P112	0.21	0.90	1.658	to existing CB on a parking lot North of Keeaumoku
P113	0.55	0.89	4.293	to existing CB at Keeaumoku St. Sta. 12+76± Rt.
P114	0.10	0.73	0.640	to existing CB at Lunalilo St. Sta. 67+80± Lt.
P115	0.09	0.76	0.600	to existing CB at Lunalilo St. Sta. 68+91± Lt.
P116	0.11	0.88	0.849	to existing CB at Lunalilo St. Sta. 70+13± Lt.
P117	0.14	0.89	1.093	to existing CB at Keeaumoku St. Sta. 14+02± Lt.
P118	0.35	0.86	2.640	to existing CB at Lunalilo St. Sta. 45+80± Lt.
P119	0.29	0.78	1.984	to existing CB South of the Lunalilo St. and Pensacola St.
P120	0.10	0.86	0.754	to existing CB at Lunalilo St. Sta. 46+01± Lt.
P121	0.62	0.87	4.731	to existing CB at Lunalilo St. Sta. 53+02± Lt.
P122	0.15	0.90	1.184	to existing CB South of the Lunalilo St. and Piikoi St.
P123	0.24	0.83	1.747	to existing CB at Lunalilo St. Sta. 54+02± Lt.
P124	0.13	0.87	0.992	to existing CB at Piikoi Service Rd. Sta. 14+94± Rt.
P125	0.05	0.86	0.377	to existing CB at Lunalilo St. Sta. 56+46± Lt.
P126	0.13	0.88	1.003	to existing CB at Lunalilo St. Sta. 57+22± Lt.
P127	0.04	0.90	0.316	sheet flow to South Beretania Street
P128	0.02	0.90	0.158	sheet flow to South Beretania Street

Interstate Route H-1 Resurfacing

Miller Pedestrian Overpass to Kapiolani Interchange

Federal- Aid Project No. H1IJK-01-17M

P129	0.05	0.90	0.395	to existing CB at McCully St. Sta. 2+48± Lt.
P130	0.10	0.90	0.789	to existing CB at McCully St. Sta. 3+66± Lt.
P131	0.18	0.90	1.421	to existing CB at McCully St. Sta. 1+89± Rt.
P132	0.26	0.90	2.052	to existing CB at McCully St. Sta. 8+91± Rt.
P133	0.28	0.85	2.087	sheet flow to Dole St.
P134	0.14	0.79	0.970	to existing CB at Metcalf St. Sta. 9+25± Lt.
P135	0.25	0.85	1.864	to existing CB at Waiaka Road Sta. 1+02± Lt.
P136	0.38	0.72	2.399	to existing CB at Waiaka Road Sta. 1+10± Rt.
P137	0.15	0.87	1.144	to existing CB at Waiaka Road Sta. 7+54± Lt.
P138	0.18	0.75	1.184	to existing CB at Waiaka Road Sta. 7+69± Rt.
P139	0.30	0.90	2.368	sheet flow to existing CB at start of Vineyard Blvd. Off
P140	0.16	0.90	1.263	sheet flow south of Punahou St. and Bingham St.
P141	0.17	0.90	1.342	sheet flow downstream South of Old Waialae Road
P142	0.19	0.90	1.500	sheet flow downstream South of Kapiolani Blvd. Off
P143	0.03	0.90	0.237	sheet flow downstream South of Kapiolani Blvd. Off
TOTAL			423.128 ft ³ /s	

NOAA Atlas 14, Volume 4, Version 3 H S P A EXP
STN 707



Station ID: 51-2146
Location name: Honolulu, Hawaii, USA*
Latitude: 21.3°, Longitude: -157.8333°
Elevation:
Elevation (station metadata): 49 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

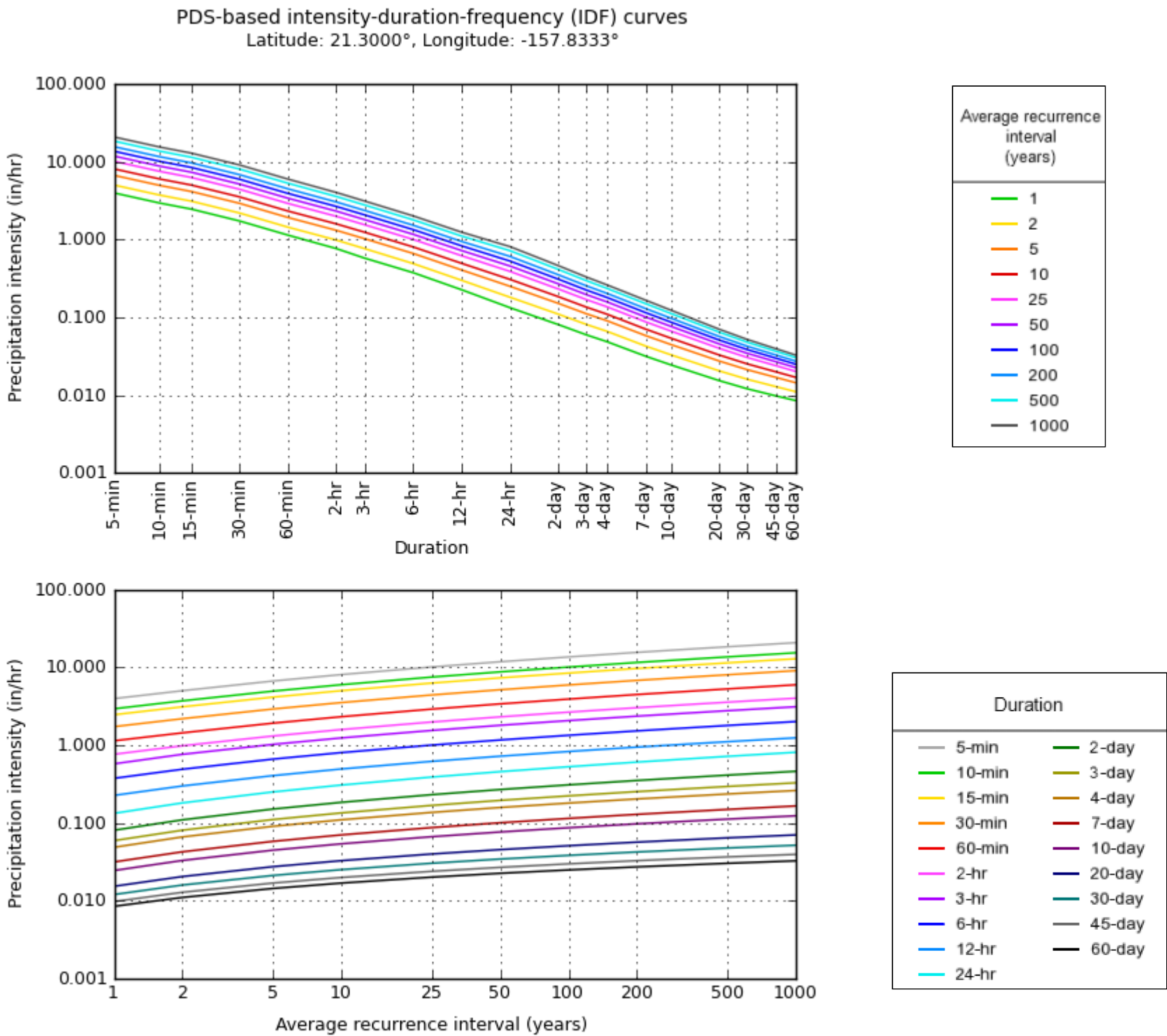
[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	3.97 (3.37-4.55)	5.02 (4.26-5.87)	6.68 (5.63-7.91)	8.09 (6.76-9.60)	10.1 (8.30-12.0)	11.8 (9.54-14.1)	13.6 (10.8-16.4)	15.6 (12.0-18.9)	18.4 (13.7-22.5)	20.8 (15.0-25.6)
10-min	2.94 (2.50-3.37)	3.72 (3.16-4.35)	4.96 (4.18-5.86)	5.99 (5.00-7.12)	7.51 (6.16-8.93)	8.77 (7.07-10.5)	10.1 (7.99-12.1)	11.6 (8.92-14.0)	13.7 (10.2-16.7)	15.4 (11.1-19.0)
15-min	2.46 (2.09-2.82)	3.12 (2.65-3.64)	4.15 (3.50-4.90)	5.02 (4.19-5.96)	6.29 (5.15-7.47)	7.34 (5.92-8.78)	8.46 (6.69-10.2)	9.69 (7.47-11.7)	11.4 (8.50-14.0)	12.9 (9.28-15.9)
30-min	1.73 (1.47-1.99)	2.19 (1.86-2.56)	2.92 (2.46-3.45)	3.53 (2.95-4.19)	4.43 (3.63-5.26)	5.16 (4.16-6.18)	5.95 (4.71-7.15)	6.82 (5.26-8.24)	8.05 (5.98-9.83)	9.09 (6.53-11.2)
60-min	1.14 (0.968-1.31)	1.44 (1.23-1.69)	1.92 (1.62-2.27)	2.32 (1.94-2.76)	2.91 (2.39-3.46)	3.40 (2.74-4.06)	3.92 (3.10-4.70)	4.49 (3.46-5.42)	5.29 (3.94-6.47)	5.98 (4.30-7.36)
2-hr	0.765 (0.647-0.867)	0.984 (0.836-1.15)	1.31 (1.10-1.55)	1.59 (1.33-1.89)	1.99 (1.63-2.37)	2.32 (1.87-2.77)	2.66 (2.11-3.20)	3.04 (2.35-3.68)	3.57 (2.66-4.38)	4.02 (2.90-4.97)
3-hr	0.576 (0.489-0.654)	0.764 (0.652-0.897)	1.02 (0.863-1.21)	1.24 (1.04-1.47)	1.55 (1.27-1.85)	1.80 (1.46-2.16)	2.07 (1.64-2.50)	2.36 (1.83-2.86)	2.78 (2.07-3.40)	3.12 (2.24-3.85)
6-hr	0.375 (0.316-0.427)	0.491 (0.419-0.576)	0.663 (0.559-0.783)	0.804 (0.671-0.954)	1.00 (0.824-1.20)	1.17 (0.944-1.40)	1.34 (1.06-1.61)	1.53 (1.18-1.85)	1.79 (1.34-2.19)	2.01 (1.45-2.48)
12-hr	0.227 (0.191-0.260)	0.299 (0.255-0.351)	0.406 (0.342-0.481)	0.495 (0.412-0.588)	0.620 (0.508-0.740)	0.722 (0.583-0.866)	0.830 (0.656-1.00)	0.945 (0.730-1.15)	1.11 (0.824-1.36)	1.24 (0.894-1.53)
24-hr	0.133 (0.114-0.157)	0.181 (0.154-0.214)	0.251 (0.213-0.296)	0.308 (0.260-0.364)	0.390 (0.326-0.463)	0.457 (0.380-0.545)	0.529 (0.435-0.634)	0.607 (0.493-0.732)	0.719 (0.573-0.875)	0.812 (0.636-0.995)
2-day	0.081 (0.069-0.094)	0.110 (0.094-0.129)	0.151 (0.129-0.177)	0.184 (0.157-0.217)	0.231 (0.195-0.273)	0.269 (0.225-0.319)	0.309 (0.256-0.369)	0.352 (0.288-0.422)	0.413 (0.331-0.500)	0.462 (0.365-0.563)
3-day	0.059 (0.051-0.069)	0.081 (0.070-0.094)	0.111 (0.095-0.130)	0.135 (0.115-0.158)	0.168 (0.143-0.198)	0.195 (0.164-0.231)	0.223 (0.186-0.266)	0.253 (0.208-0.303)	0.295 (0.238-0.356)	0.329 (0.260-0.400)
4-day	0.049 (0.042-0.057)	0.066 (0.057-0.077)	0.091 (0.078-0.106)	0.110 (0.094-0.129)	0.137 (0.117-0.161)	0.158 (0.134-0.187)	0.180 (0.151-0.214)	0.204 (0.168-0.243)	0.236 (0.191-0.285)	0.262 (0.208-0.319)
7-day	0.032 (0.027-0.037)	0.043 (0.037-0.050)	0.058 (0.050-0.068)	0.070 (0.060-0.082)	0.087 (0.074-0.103)	0.101 (0.085-0.119)	0.115 (0.096-0.136)	0.129 (0.106-0.154)	0.150 (0.121-0.180)	0.166 (0.132-0.201)
10-day	0.025 (0.021-0.028)	0.033 (0.029-0.038)	0.045 (0.039-0.052)	0.054 (0.046-0.063)	0.067 (0.057-0.078)	0.077 (0.065-0.090)	0.087 (0.073-0.103)	0.098 (0.081-0.117)	0.112 (0.091-0.135)	0.124 (0.099-0.150)
20-day	0.015 (0.013-0.018)	0.021 (0.018-0.024)	0.027 (0.024-0.032)	0.033 (0.028-0.038)	0.040 (0.034-0.047)	0.046 (0.038-0.054)	0.051 (0.043-0.060)	0.057 (0.047-0.068)	0.064 (0.052-0.078)	0.070 (0.056-0.085)
30-day	0.012 (0.010-0.014)	0.016 (0.014-0.019)	0.021 (0.018-0.025)	0.025 (0.022-0.029)	0.030 (0.026-0.036)	0.034 (0.029-0.041)	0.038 (0.032-0.046)	0.042 (0.035-0.051)	0.048 (0.039-0.058)	0.052 (0.041-0.063)
45-day	0.010 (0.008-0.011)	0.013 (0.011-0.015)	0.017 (0.015-0.020)	0.020 (0.017-0.023)	0.024 (0.020-0.028)	0.027 (0.023-0.032)	0.030 (0.025-0.035)	0.033 (0.027-0.039)	0.037 (0.030-0.044)	0.040 (0.031-0.048)
60-day	0.009 (0.007-0.010)	0.011 (0.010-0.013)	0.014 (0.012-0.017)	0.017 (0.015-0.020)	0.020 (0.017-0.024)	0.023 (0.019-0.027)	0.025 (0.021-0.030)	0.027 (0.023-0.033)	0.030 (0.025-0.037)	0.033 (0.026-0.040)
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.										

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PF graphical



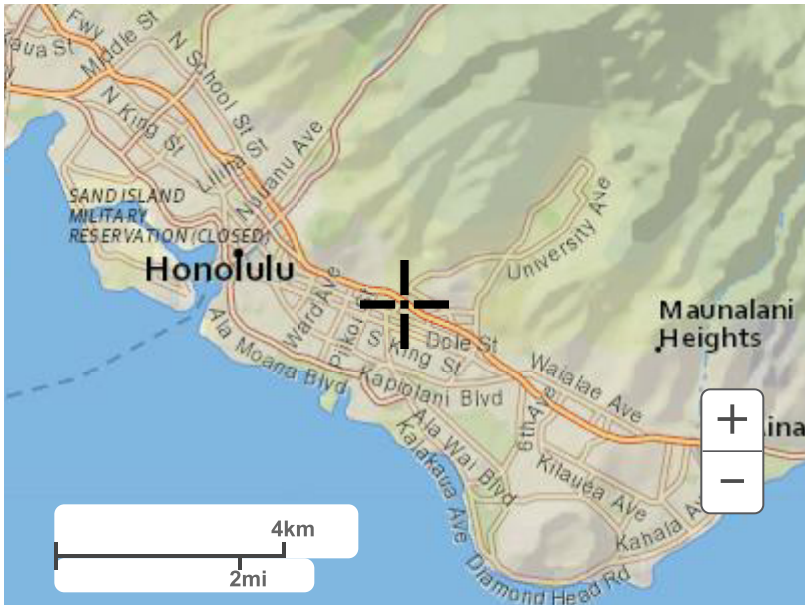
NOAA Atlas 14, Volume 4, Version 3

Created (GMT): Tue Jul 7 08:00:01 2020

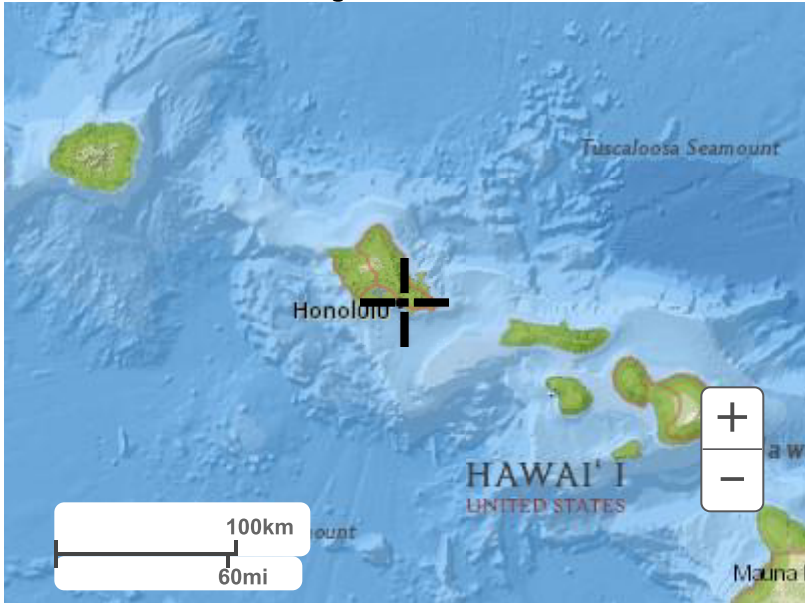
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Maps & aerials

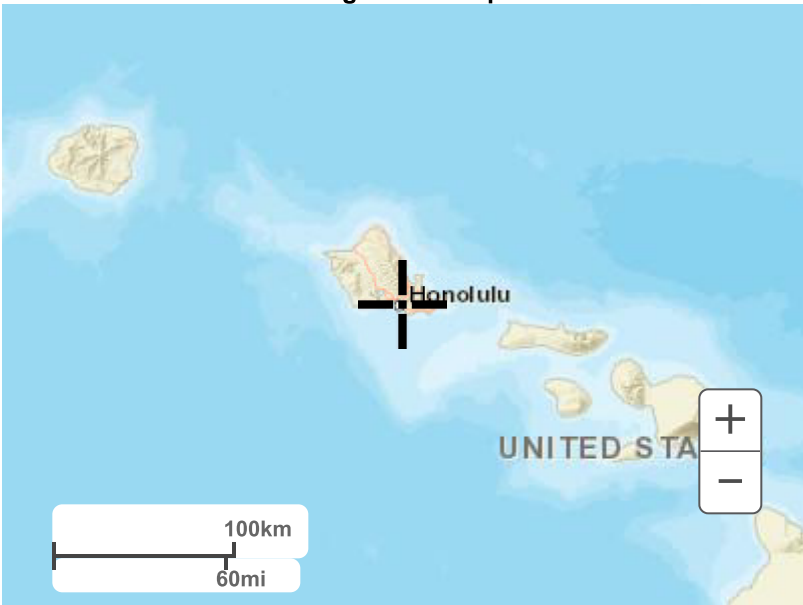
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov
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PEAK FLOW CALCULATIONS
Interstate Route H-1 Resurfacing - Miller Ped Overpass to Kapiolani Interchange
Calculated Pre-Development and Post-Development Flow Rates

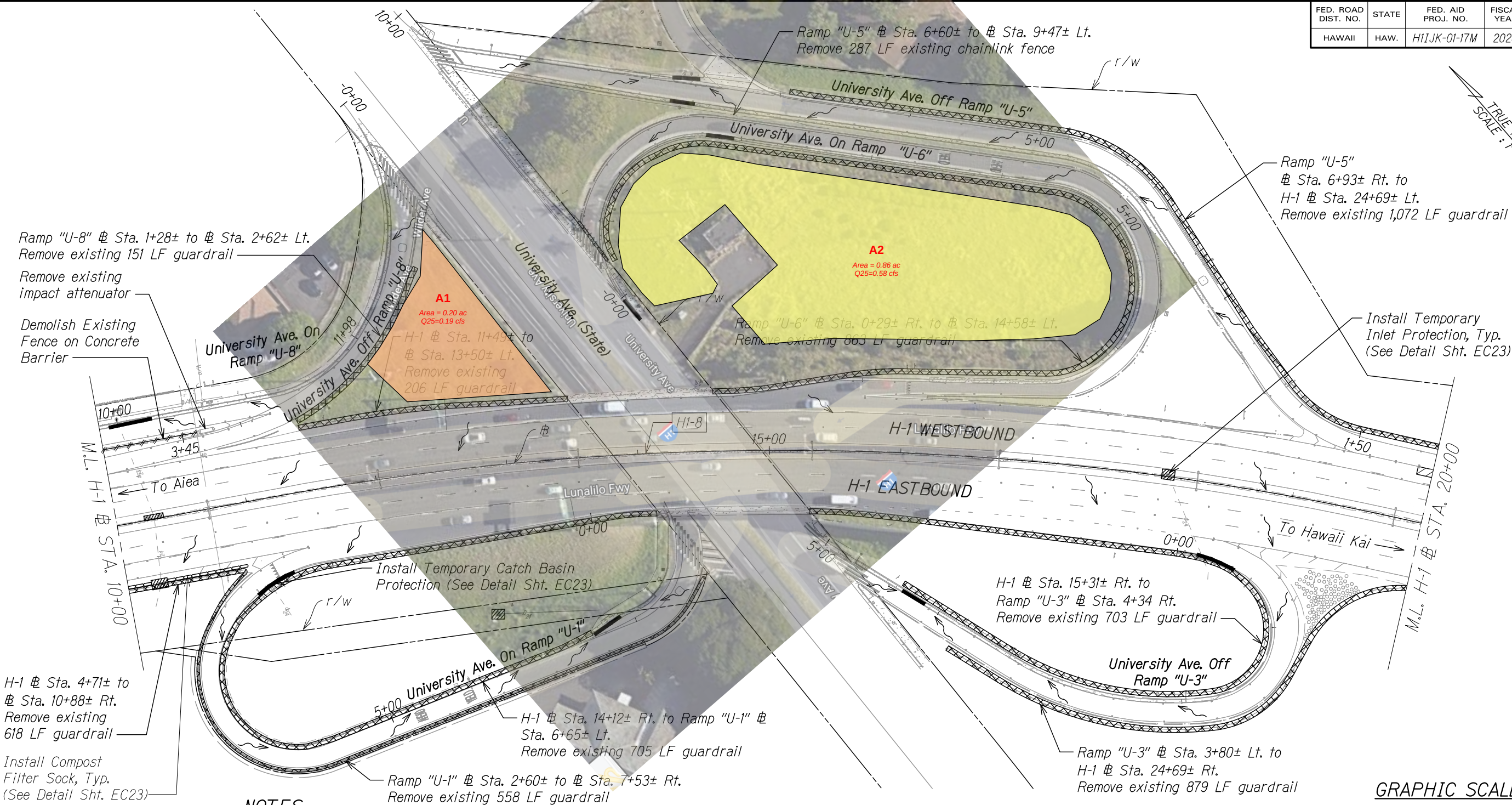
Designer: MPL
 Date: 10-Jun-20

Location	Drainage Area ac		Longest Distance ft	Average Slope %	Time of Conc min	Design Rainfall Inten-25y in/hr	Correction Factor	Runoff Coeff.	Q 10-yr cfs	Discharge to:
PRE-DEVELOPMENT CONDITION										
A1	0.20	0.20	150.00	7.00	11.75	2.79	2.20	0.15	0.19	Existing Grassed Area
A2	0.86	0.86	300.00	2.00	25.50	2.79	1.60	0.15	0.58	Existing Grassed Area
Total	1.06				PRE-DEVELOPEMT FLOW				0.76	
POST-DEVELOPMENT CONDITION										
A1	0.20	0.20	150.00	7.00	11.75	2.79	2.20	0.15	0.19	Existing Grassed Area
A2	0.86	0.86	300.00	2.00	25.50	2.79	1.60	0.15	0.58	Existing Grassed Area
Total	1.06				POST-DEVELOPEMT FLOW				0.76	
					NET INCREASE POST-DEVELOPEMT				0.00	

Drainage Area = Area of subbasin (acre)
 Longest Distance = Longest travel path of water runoff in subbasin (feet)
 Elevation High = Highest elevation point in subbasin (feet)
 Elevation Low = Lowest elevation point in subbasin (feet)
 Slope (S) = Average slope in subbasin determined from high/low elevation and longest distance (feet/feet)
 Time of Concentration (Tc) = Based on Plate 3
 Rainfall Intensityr = Based on Plate 4
 I Hr Rainfall Intensity (I) = Based on Plate 1 (10 years)
 Runoff Coefficient (C) = based on Correction Factor (CF) Table 2
 Discharge (Q) = $C \times I \times CF \times A$ (cfs)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H11JK-01-17M	2020	21	244

TRUE NORTH
SCALE: 1" = 40'



Ramp "U-8" @ Sta. 1+28± to @ Sta. 2+62± Lt.
Remove existing 151 LF guardrail
Remove existing impact attenuator
Demolish Existing Fence on Concrete Barrier

Ramp "U-5" @ Sta. 6+60± to @ Sta. 9+47± Lt.
Remove 287 LF existing chainlink fence

Ramp "U-5" @ Sta. 6+93± Rt. to H-1 @ Sta. 24+69± Lt.
Remove existing 1,072 LF guardrail

Ramp "U-6" @ Sta. 0+29± Rt. to @ Sta. 14+58± Lt.
Remove existing 663 LF guardrail

Install Temporary Inlet Protection, Typ. (See Detail Sht. EC23)

Install Temporary Catch Basin Protection (See Detail Sht. EC23)

H-1 @ Sta. 15+31± Rt. to Ramp "U-3" @ Sta. 4+34 Rt.
Remove existing 703 LF guardrail

H-1 @ Sta. 4+71± to @ Sta. 10+88± Rt.
Remove existing 618 LF guardrail

Install Compost Filter Sock, Typ. (See Detail Sht. EC23)

H-1 @ Sta. 14+12± Rt. to Ramp "U-1" @ Sta. 6+65± Lt.
Remove existing 705 LF guardrail

Ramp "U-1" @ Sta. 2+60± to @ Sta. 7+53± Rt.
Remove existing 558 LF guardrail

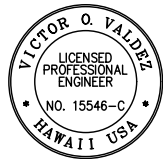
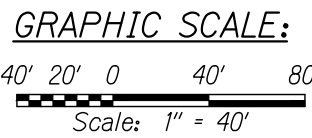
Ramp "U-3" @ Sta. 3+80± Lt. to H-1 @ Sta. 24+69± Rt.
Remove existing 879 LF guardrail

NOTES:

1. Sediment and Erosion Control BMP measures shown in the Contract Documents are minimum BMPs requirements and do not constitute an acceptable and/or complete Sediment and Erosion Control Plan. The Contractor shall incorporate additional BMPs based upon their means and methods considering site conditions and construction sequence in accordance with the Contract Documents including applicable permit document requirements. Cost shall be included in Pay Item 209.0100, Installation, Maintenance, Monitoring, and Removal of BMP.
2. The Contractor shall take proper precautions and make necessary measures to ensure compliance to all applicable but not limited to Federal, State, and HDOT guidelines.
3. Limits of milling and roadway pavement reconstructions, including on and off ramps are shown in the Roadway Plan R1 - R22.
4. Traffic sign relocations and any other sign-related works resulting from the proposed improvements are shown in the Pavement Marking and Signing Plans M2 - M24.
5. The Contractor shall only remove existing bushes and vegetation that may hinder construction work for this project related activities/phases and within the right-of-way. The Contractor shall be responsible to protect all open bare areas during all phases of construction to prevent erosion. Best Management Practices shall not be removed until final stabilization is complete for that phase. Bushes and vegetation shall be restored to pre-construction condition prior to final acceptance.

LEGEND:

- Catch Basin Protection
- Flow Arrow
- Inlet Protection
- Filter Socks
- Demolish Existing Guardrail or Impact Attenuator
- Demolish Existing Fence on Concrete Barrier



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE

04/30/22
EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
Existing and Proposed Areas for Staging and Storage Areas
INTERSTATE ROUTE H-1 RESURFACING
Miller Pedestrian Overpass to Kapiolani Interchange
Federal Aid Project No. H11JK-01-17M
Scale: 1" = 40' Date: June 2020
SHEET No. EC13 OF 23 SHEETS

C:\CIVIL 3D PROJECTS\2016_2022\000_DOT-HWYS H1 RESURFACING - MILLER TO KAPITOLI CIVIL DRAWINGS\EC13-EC16 DEMO AND EC PLANDWG 6/2/2020 9:05 PM

Plate 3 Overland Flow Chart

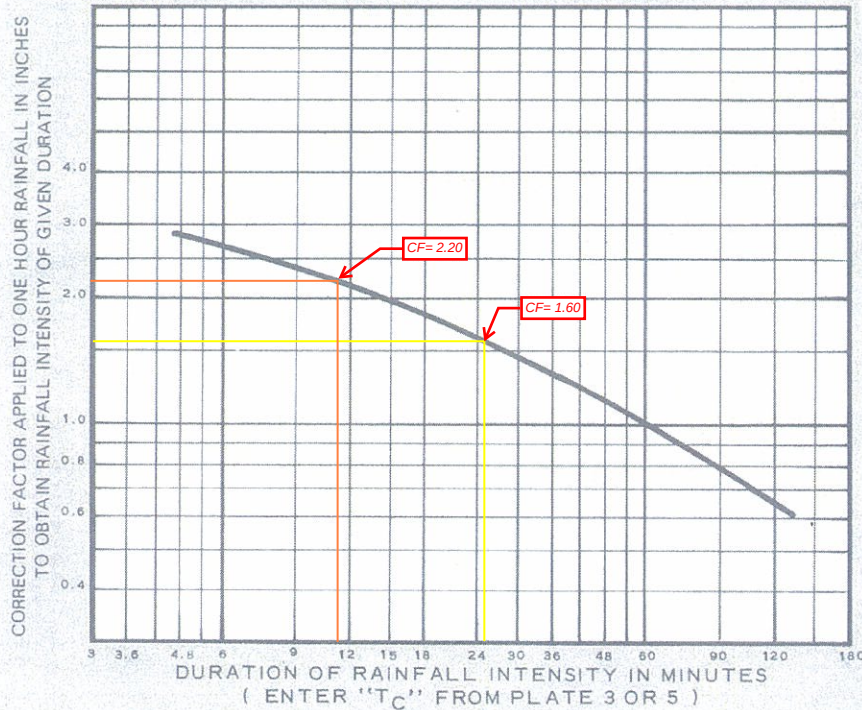
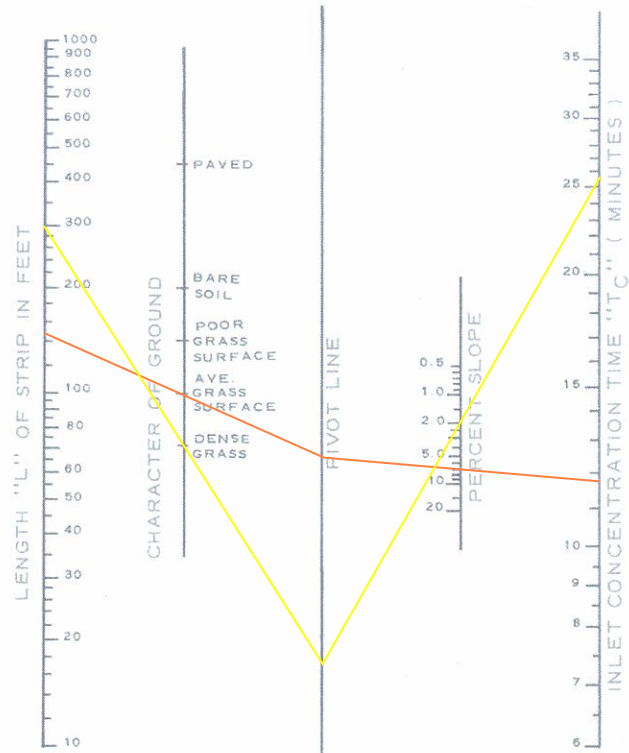


Plate 4

CORRECTION FACTOR
FOR CONVERTING 1 HR. RAINFALL
TO RAINFALL INTENSITY
OF VARIOUS DURATIONS

TO BE USED FOR AREA
LESS THAN 100 ACRES
(See Plate 6 on page 20 for
area more than 100 acres)